Hospital Based Audit of Obstetric Care and Birth Preparedness in rural Rwanda

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CHAPTER 1:

INTRODUCTION

1.1 Scope and Aim

Globally, maternal deaths decreased by 43% from 532,000 in 1990 to 303,000 in 2015 [1, 2]. Most deaths occur in low- and middle-income countries (LMIC) [1-3]. After the genocide in Rwanda in 1994, which left a death toll of more than one million people, much of the health infrastructure was destroyed. The government of Rwanda started rebuilding the country with particular attention to political stability in order to reinvigorate the economy and rebuild infrastructure. By the start of the millennium, major social and health reforms were initiated, guided by a long-term development framework known as Rwanda Vision 2020. This led to a significant reduction of the maternal mortality ratio (MMR) from 1,071 deaths per 100,000 live births in 2000 to 210 in 2015 [4, 5]. One third up to half of all maternal deaths are related to inadequate access to appropriate maternity care in women with prolonged or obstructed labor, (pre-) eclampsia and postpartum hemorrhage [6]. Inadequate access, in this respect, comprises delays in seeking, reaching and obtaining adequate care upon arrival in health facilities in a fragmented, weak health system [7].

Absence of timely access to quality care has been described as "too little, too late". At the same time, the opposite, "too much, too soon"—i.e. excessive medicalization of basic antenatal, intrapartum, and postnatal care is harmful as well, and on the rise, also in LMICs [3, 8, 9]. While skilled birth attendance increases in LMICs, many countries still have to deal with inadequate numbers of staff and lack of training opportunities, poor infrastructure and absence of essential care commodities. Combined with insufficient attention to providing evidence-based local clinical practice, these factors result in overuse of potentially harmful interventions -especially induction and augmentation of labor and cesarean section [9-11]. We studied 'too little, too late' and 'too much, too soon' in this thesis by assessing quality of care for women with severe maternal complications (by using the maternal near miss (MNM) concept) [12], women who gave birth by cesarean section in a previous pregnancy and women with prolonged labor, in order to identify opportunities for improvement.

In 2003, Rwanda adopted Birth Preparedness and Complication Readiness (BP/CR) as part of 'focused Antenatal Care' to increase health provider-woman contact time, in an effort to ensure that every woman is explained 'obstetric danger signs' that may occur during pregnancy, childbirth and the postpartum period [13]. At the same time, several studies have shown inadequate uptake of antenatal care and lack of continuity of maternal health care from the beginning of pregnancy up to the postpartum period, indicating that both the uptake of BP/CR-related messages and the impact of

these messages on the uptake of peripartum care are limited [14, 15].

1.2 Background

Over the last three decades, much progress in reducing the global MMR has been made, corresponding with an estimated annual reduction of 1.3% since 1990 [1-3]. This could in part be due to successful efforts to address the direct causes of pregnancy-related deaths: early detection of high risk pregnancies, increased skilled birth attendance and access to emergency obstetric and neonatal care [2, 3]. Nonetheless, maternal mortality and morbidity did not decline as rapidly as hoped, with most countries not reaching the fifth Millennium Development Goal (MDG) [16]. Rwanda was one of only nine countries that reached this MDG, which aimed to reduce maternal mortality by three quarters in 2015, compared to the level of 1990. The other countries were Bhutan, Cape Verde, Cambodia, Iran, Laos, Maldives, Mongolia and Timor-Leste [2]. As follow up of the MDGs, the Sustainable Development Goals (SDG), and specifically SDG3, were launched to reduce the global MMR from 216 per 100,000 live births in 2015 to less than 70 by 2030 [17]. The Rwandan government expressed political commitment towards further health system improvements and increased access to quality care before, during and after childbirth in order to achieve the SDGs [2, 17, 18].

Direct causes of maternal mortality include hemorrhage, hypertensive disorders, sepsis or severe systemic infections, obstructed labor and unsafe abortion. These account for more than 70% of maternal deaths worldwide. Indirect causes as a result from pre-existing disease or disease developing during pregnancy from its physiological changes include HIV/AIDS, malaria, anemia, cardiovascular diseases and diabetes, and contribute 30% of maternal deaths [2, 9]. Some have argued that the division between direct and indirect has become less meaningful and, in some cases, misleading [19]. It is clear that evidence-based interventions are needed to increase rapid access to timely obstetric care for all women, including those with pre-existing disease [2, 9, 20]. Since obstetric complications are often unpredictable, universal access to skilled birth attendance is an important strategy to prevent maternal mortality [16].

Since maternal mortality appears to be decreasing, particularly in a country like Rwanda, it is increasingly critical to measure maternal morbidity in order to monitor the quality of facility-based maternity care. Severe maternal morbidity occurs more frequently than mortality and yet can have significant impact on a woman's life [12]. Women who eventually die first sustain severe maternal

morbidity. Therefore, it is presumed that women who experience severe maternal morbidity share similar characteristics to women who die [12, 21].

1.3 Conceptual Framework

The conceptual framework for this thesis (Figure 1) was based on the maternal morbidity measurement framework [22], designed by WHO Maternal Morbidity Working Group as a means to develop standardized definitions, identification criteria, and measurement tools for the continuum of maternal morbidity [22]. This maternal morbidity measurement framework represents a reproductive health cycle as an ellipse and in this thesis we focused on pregnancy, labor, childbirth and puerperium realizing that many of the external factors at the top of the framework, which were not studied, do interact with the reproductive health cycle, and influence women's risks of becoming pregnant or developing complications during pregnancy [22].

The health conditions (bottom left, pink box) studied as part of the continuum of maternal health included MNM and associated factors such as prolonged labor or a scarred uterus due to a previous cesarean section. These were assessed using the WHO MNM tool and WHO partograph as measures to improve quality of obstetric care in Rwanda. The challenge of reducing maternal morbidity and mortality does not only involve improving overall quality of obstetric care at hospital-level, but also improving access to education and socio-economic opportunities for women. The pre-pregnancy period provides opportunities to establish provider-woman contact, and thereby opportunities for health promotion related to prevention of mother-to-child HIV transmission services, nutritional education as well as BP/CR [23]. BP/CR was explored in detail among women and community members using the three delays model [7].

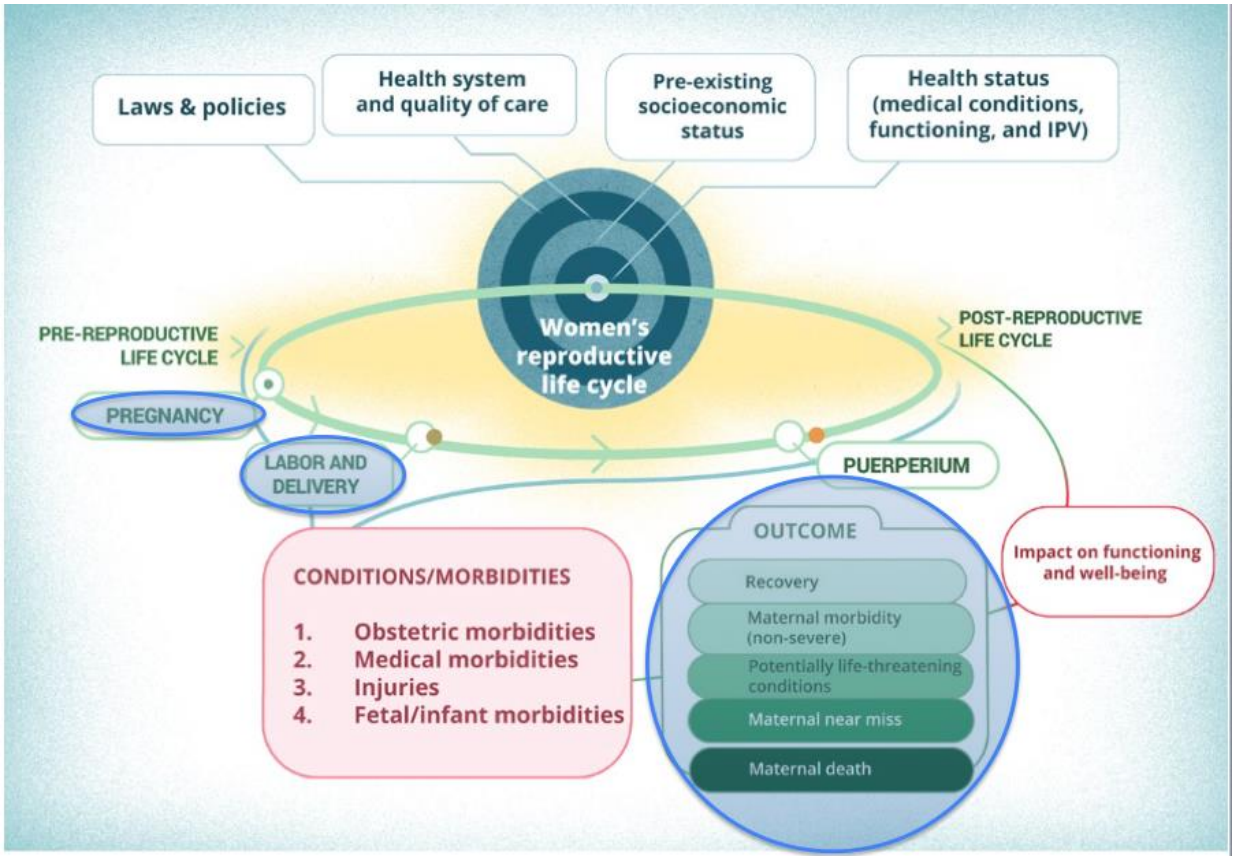

Figure 1. Maternal morbidity measurement framework [22]

The maternal near-miss concept

WHO defines MNM as a woman who nearly died but survived a complication that occurred during pregnancy, childbirth or within 42 days of termination of pregnancy [12]. The WHO MNM approach utilizes audit to assess and improve quality of obstetric care [12]. Evaluators critically review appropriateness of care and scrutinize care processes provided in women with MNM [12]. Aim is to identify lessons learned from near-miss events and how these can be averted in the future, by designing tailored and multifaceted interventions to address identified obstacles and gaps [12, 20].

The WHO MNM tool comprises three groups of criteria with clinical, laboratory and management based parameters focusing on the presence of organ dysfunction [12, 21]. The tool has been criticized, since several laboratory-based and some management-based criteria reflecting organ dysfunction are generally not available in resource-limited settings [24, 25].

'Too little, too late' and/or 'too much, too soon'?

When women are seeking obstetric service, some receive excellent care, but too many experience one of two extremes, which may be described as: 'too little, too late' or 'too much, too soon'. Both extremes represent maternal health care not grounded in evidence [9]. A growing number of LMICs now struggle with both extremes, with 'too little, too late' among the most vulnerable, and 'too much, too soon' care among the wealthier and those in private care. Causes are complex and often rooted in structural health system deficiencies, such as insufficient equipment, supplies and medicines [3, 9, 23], inadequate numbers of skilled providers, insufficient training [10, 26], lack of evidence-based guidelines [10], women giving birth alone, lack of emergency medical services and delayed inter-facility referrals [27, 28]. In this thesis, we will address quality of care among women with MNM and associated conditions (prior cesarean section and prolonged labor) at a local facility in order to identify shortfalls in clinical practice and the referral system.

Conversely, the rapid increase in skilled birth attendance has introduced new challenges, especially excessive medicalization during birth which may lead to inappropriate use of interventions. Excessive medicalization characterized by 'too much, too soon', may offset gains resulting from improvements in maternal and perinatal health [3]. Over-medicalization occurs in high-income countries and a growing number of LMICs passing through the obstetric transition from direct to indirect causes of maternal mortality and from high to lower maternal mortality [3, 9]. Some interventions may be good and harmful at the same time. For example, although induction and augmentation of labor can be effective (even life-saving) procedures when indicated, overuse (without clear medical indication) has been associated with perineal lacerations and anal sphincter injury [29]. Cesarean section without medical indication has exposed women and their (future) children to risks of morbidity and mortality, and unnecessary costs to families and health systems [30].

Phases of delay

Thaddeus and Maine [7] have provided an explanatory model which explains why women may (nearly) die around childbirth. Delay in receiving good quality healthcare is perceived to be an important contributing factor to poor maternal outcome [31].

The first delay is delay in seeking care due to delay in recognizing danger signs of deteriorating health

[32]. This may occur when women have not received education about obstetric danger signs during ANC or do not attend ANC at all, which may be due to previous bad experiences in health facilities [9, 32]. In sub-Saharan Africa, family members or partners are usually the main decision makers regarding whether a woman is allowed to visit a health facility or not, which may cause unnecessary delays [32, 33] Others are level of education, socio-economic empowerment, religion, or a combination of these factors influencing the decision to go to a health facility [32-34].

The second delay is delay in reaching health facilities, after a decision has been made to seek care. This delay mainly relates to transport, infrastructure and lack of financial means to cover costs of transport and healthcare utilization [35]. To address this problem, in 2011, all district hospitals in Rwanda were equipped with functional ambulances [36]. However, maintaining these ambulances has been problematic due to budget constraints, rendering them regularly unavailable.

The third delay is delay in receiving timely adequate care once in the health facility. Many determinants of third delay have been described. Shortage of health care providers has been a challenge in Rwanda, with indicators showing the number of medical doctors per inhabitant to be 1/15 428 and 1/1200 for nurses with an uneven distribution between rural and urban areas [37]. Some authors have argued how the latter has resulted in lower commitment and motivation by health providers leading to low quality [38, 39] and disrespectful maternal care [40].

Utilization of skilled birth attendance can be achieved by providing birth preparedness information empowering the community with knowledge about danger signs and ways to prepare for childbirth and emergency situations. An increased knowledge level is envisaged to reduce delays in seeking, accessing and even receiving appropriate care [7]. Ultimately, BP/CR will lead to a reduction in maternal and neonatal mortality [41]. Studies conducted in sub-Saharan African countries report low rates of birth preparedness [34, 41]. High levels of BP/CR have been shown to be strongly associated with increased skilled birth attendance [42, 43]. However, BP/CR also requires health facilities to be adequately equipped to meet increased demand for care [41, 44].

1.4 Aim of the Study and Research Questions

General aim of this thesis is to increase understanding of factors that contribute to severe maternal morbidity and mortality in Rwanda, with special focus on factors that impede accessibility and utilization of emergency obstetric care.

The following research questions were studied:

1. What is the incidence of severe maternal morbidity and mortality and quality of care at a district hospital in rural Rwanda by applying the adapted WHO near miss approach? (Chapter two)
2. What are maternal and perinatal outcomes of trial of labor after cesarean section and elective repeat cesarean section in a district hospital in rural Rwanda? (Chapter three)
3. How often is prolonged labor adequately managed, and how do labor progress and fetal outcomes of uncomplicated and prolonged labor compare, using the partograph in rural Rwandan hospitals? (Chapter four)
4. What are the practices around and factors associated with BP/CR among pregnant women admitted with obstetric emergencies in a rural Rwandan hospital? (Chapter five)
5. What are facilitators and barriers to BP/CR among community health workers and community members in rural Rwanda? (Chapter six)

Study setting

Rwanda is a small mountainous and landlocked country bordered by Uganda in the North, Burundi in the South, Tanzania in the East and the Democratic Republic of Congo in the West. The country has an estimated population of 11,533,476 inhabitants [5] living in an area of 26,338 km^2, or 471 persons per km^2. It is the most densely populated country in Africa. Administratively, it is divided into five provinces, including Kigali city as one. These are organized into districts, which are further divided into sectors and cells, with 'the village', also called '*umudugudu*' being the smallest administrative unit (Figure 2). Rwanda's GDP per Capita is 765 USD, and it is categorized as a low-income country. Extreme poverty has reduced from 45% to 39% [5, 45], indicating some progress in the socio-economic situation of people.

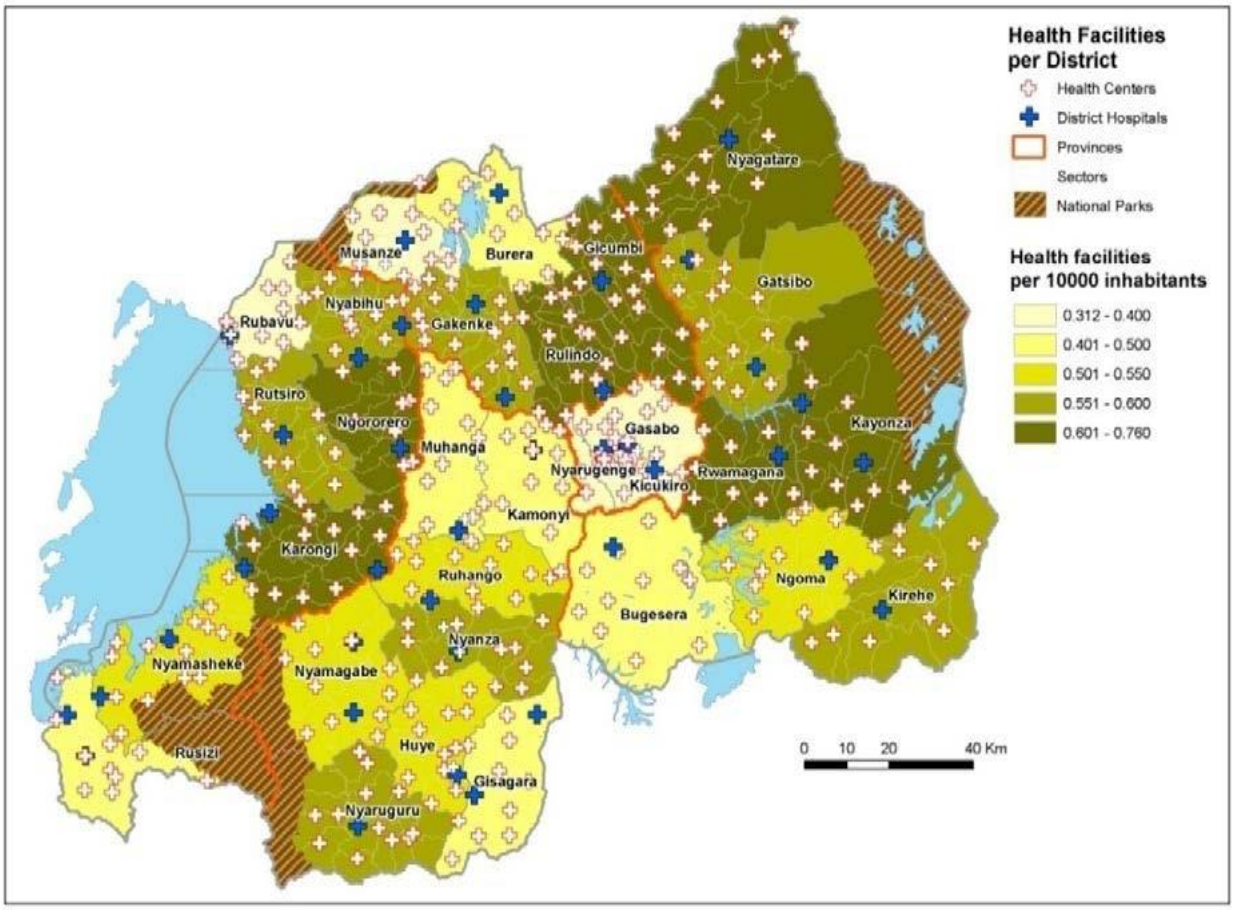

Figure 2: Map of Rwanda showing distribution of health facilities

Musanze district is located in northern Rwanda, at 94 km from the capital Kigali, and has a population of 368,267 inhabitants with a total fertility rate of 4.6 births per woman [5]. The percentage of births in health facilities is estimated at 48.8% [5] ranking among the lowest in the country. The district benefits from services of 1,296 community health workers, including 432 community health workers specially tasked with maternal and child health. The latter group was provided with mobile phones to report data on maternal and child health indicators (antenatal care, birth, maternal mortality, postnatal care, anthropometric measurements and child mortality) using the RapidSMS® system. This system also enables these health workers to be in contact with the rest of the health system (ambulance and health facility staff). Medical services are paid for using community-based health insurance (commonly known as *mutuelles de santé*), with an annual fee of RWF 3000 (US$ 4), plus a 10% co-payment for each episode of illness.

Each health center has one community officer ('supervisor') supervising an average of 55 community health workers operating in the villages within the center's catchment area. A community health representative working at district hospital level manages these supervisors. This same community management structure is present in all districts across the country. Ideally, pregnant women are identified and followed by community health workers, who advise them to go for antenatal care at their nearby health center. These health centers have guidelines for referring women with high-risk pregnancies or complications to Ruhengeri hospital. The expected number of pregnancies in Musanze district is about 14,200 per annum, giving an average of 30 pregnancies per year and 2-3 per month to be identified and followed up by one community health worker.

Ruhengeri hospital, which was the main study site, acts as a provincial referral hospital for women with high-risk or complicated pregnancies from 13 health centers and the other three district hospitals in the northern province. Annually, 3500 births occur in the facility. According to the population census, northern province had a population of 1,729,903 inhabitants with a total fertility rate of 3.7 births per woman in 2012. During the study period, medical staff consisted of one specialist obstetrician, four medical officers, two intern doctors and 18 midwives. Women with critical conditions were admitted into the intensive care unit that has a 10-bed capacity, where vital signs are monitored hourly, and treatment with vasoactive drugs and mechanical ventilation can be provided. Blood for transfusion was supplied by the regional blood bank located next to the hospital.

Study methodology

We applied both quantitative and qualitative research methods to address the aims of this thesis.

To measure the incidence of MNM and quality of obstetric care we performed a prospective cohort study at Ruhengeri hospital between June 2013 and December 2014 (Chapter 2). Subjects were followed from time of admission to discharge or death. Eligibility for the study was not restricted by gestational age. We tried as much as possible to apply the WHO MNM criteria but had to make several modifications due to lack of laboratory tests and management options. A structured data extraction form was used to collect data for all MNM and maternal deaths to identify underlying causes of morbidity and mortality, MNM indicators, maternal and fetal outcomes upon discharge and interventions provided. The data collected motivated us to further explore quality of care provided to women with a scarred uterus and prolonged labor, since these two associated factors were found to be associated with MNM and maternal death in Ruhengeri.

Given the high cesarean section rate of 35 % at Ruhengeri and previous cesarean section being a major indication for another cesarean section in the subsequent pregnancy, we sought to examine whether the concerns about offering trial of labor to women present at our facility were justified, and assessed the risk of maternal morbidity and perinatal mortality associated with trial of labor compared to elective repeat cesarean section (Chapter 3).

We explored how prolonged labor was managed using a partograph. A retrospective chart review of obstetric records between January and December 2011 was conducted to evaluate completion of partographs for women who with uncomplicated and prolonged labors at three public hospitals in rural Rwanda. Every partograph was assessed using the following criteria: A) whether the action line was reached or crossed, and subsequently B) whether membranes were artificially ruptured, C) whether oxytocin augmentation was performed, D) whether assisted vaginal birth was considered in case the woman reached the second stage of labor (Chapter 4).

Two-thirds of women with severe maternal outcome who arrived at Ruhengeri hospital were already in critical condition. Therefore, we assessed the implementation of BP/CR among pregnant women admitted with obstetric emergencies between July and November 2015. The 'Safe Motherhood questionnaire' as developed by Jhpiego's Maternal and Neonatal Health Program was used to collect data. Women were asked to mention key danger signs and respond whether they had identified: (A)

skilled birth attendant, (B) location to give birth, (C) mode of transport, (D) money to cover health care expenditure. Women who answered 'yes' to three or four items were labeled 'well prepared' (Chapter 5). The final research question was answered in a qualitative study conducted among community health workers, elderly women aged 45–68 and men aged 18–59 and additional key informants between November and December 2015 to understand facilitators and barriers to BP/CR in rural Rwanda.

1.5 Structure of the Thesis

This thesis is composed of eight chapters.

Chapter 2 presents the incidence of MNM, characteristics of women with MNM and describe issues related to quality of care in Ruhengeri Hospital, a district hospital in rural Rwanda, by applying the adapted WHO MNM approach.

Chapter 3 examines whether concerns about offering a trial of labor to women with a previous cesarean section in a rural sub-Saharan African setting are justified, and assesses the risk of maternal morbidity and perinatal mortality associated with trial of labor compared to elective repeat cesarean section in a district hospital in rural Rwanda.

Chapter 4 explores how often prolonged labor was adequately managed and compared labor progress and fetal outcomes of uncomplicated and prolonged labor using the partograph in rural Rwandan hospitals.

Chapter 5 explores implementation of BP/CR among pregnant women admitted with obstetric emergencies in Ruhengeri hospital.

Chapter 6 explores perceptions held by CHWs and community members about BP/CR.

Chapter 7 places the findings from chapter 2 to 6 into a broader perspective, and gives conclusions and recommendations following from the thesis at large. Furthermore, areas for further research are suggested.

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